Subject Name: **Source Code Management**

Subject Code: **CS181**

Cluster: **Beta**

Department: **DCSE**

CHITKARA UNIVERSITY

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G1

Submitted To:
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AIM 1: SETTING UP OF GIT CLIENT.

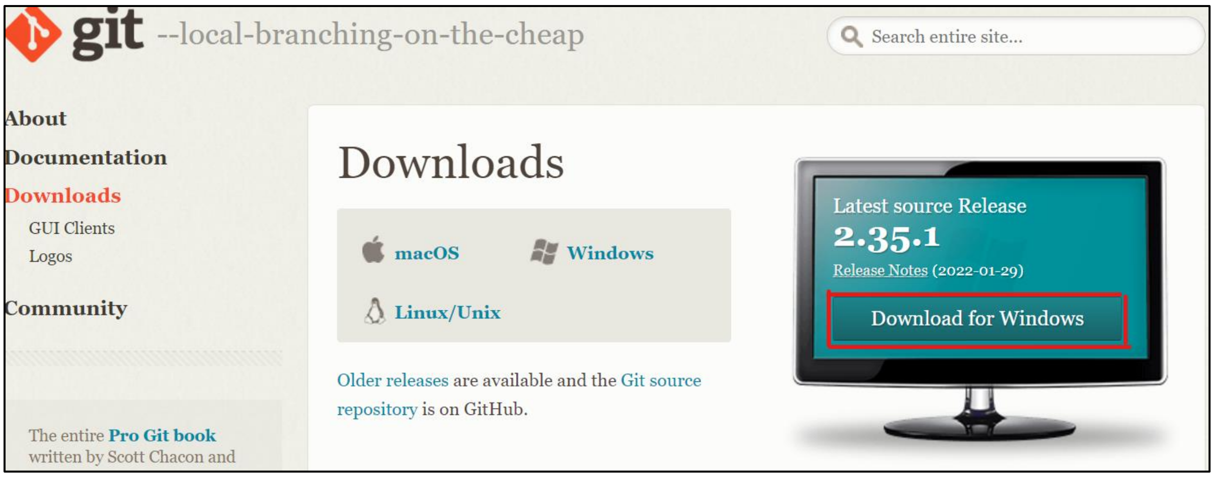
THEORY:

What is GIT?
Git is a free and open-source version control system used to handle small to very large projects efficiently.
It is used to tracking changes in the source code, enabling multiple developers to work together on non-linear development.

How To Install GIT On Windows

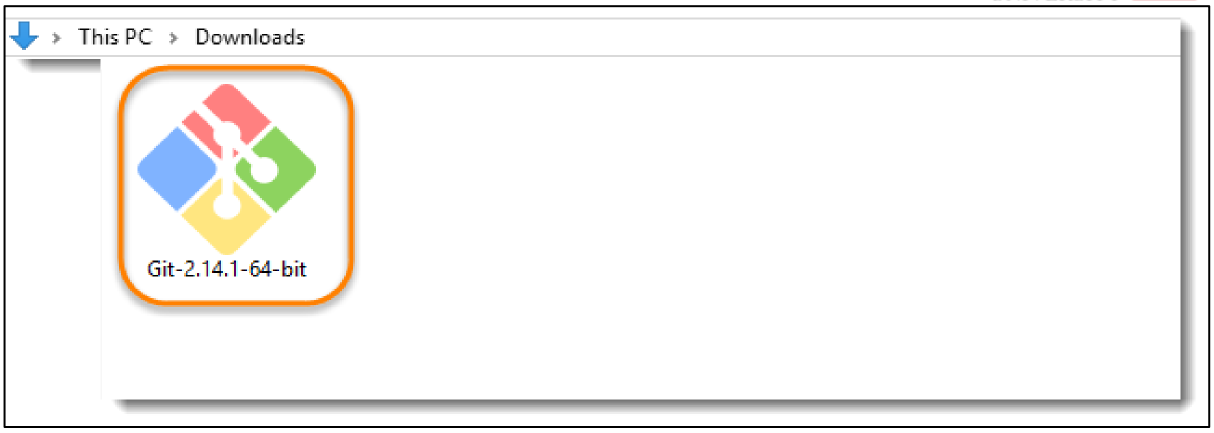
PROCEDURE:

STEP1: We can install Git on Windows, using the most official build which is available for download on the GIT's official website or by just typing (scmgit) on any search engine.



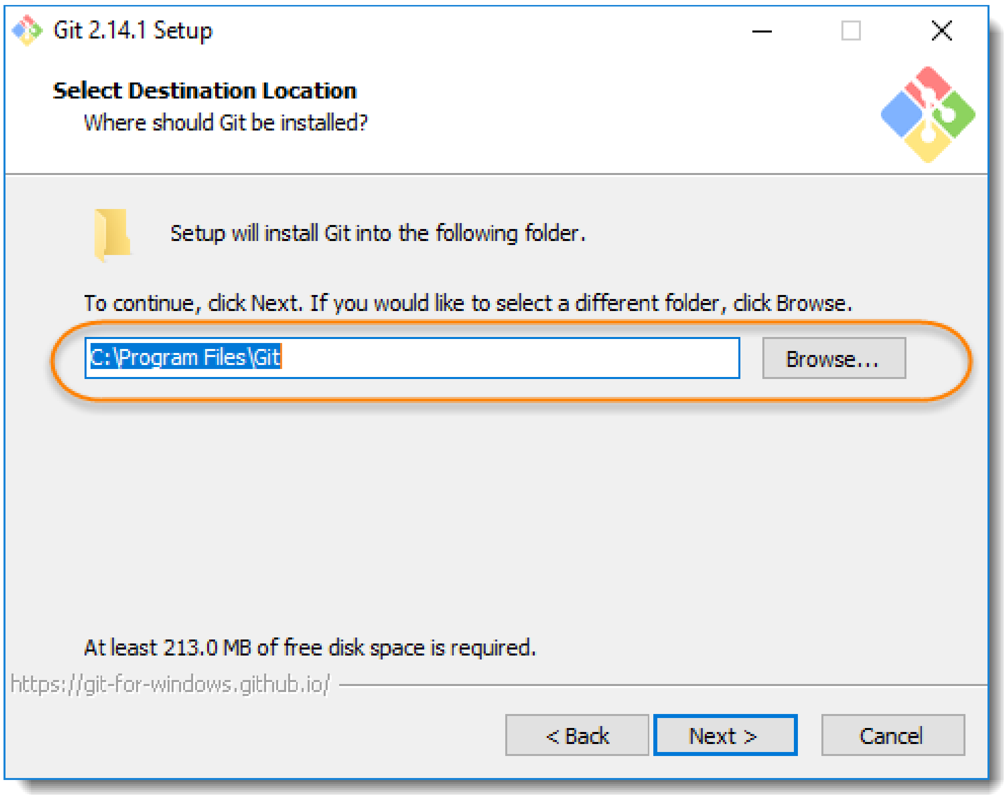
Older releases are available and the Git source repository is on GitHub.

STEP2: Click on download for windows. Go to the folder where new downloads get store. Double click on the installer. The installer gets save on the machine as per the Windows OS configuration.



STEP 3: When you've successfully started the installer, you should see the Git Setup wizard screen. Follow the Next and Finish prompts to complete the installation.

STEP 4: You may like to keep the installation to another folder, so you can set the path of destination location using browse option or either let it be as shown and continue.


Git 2.14.1 Setup

Select Destination Location

Where should Git be installed?

Setup will install Git into the following folder.

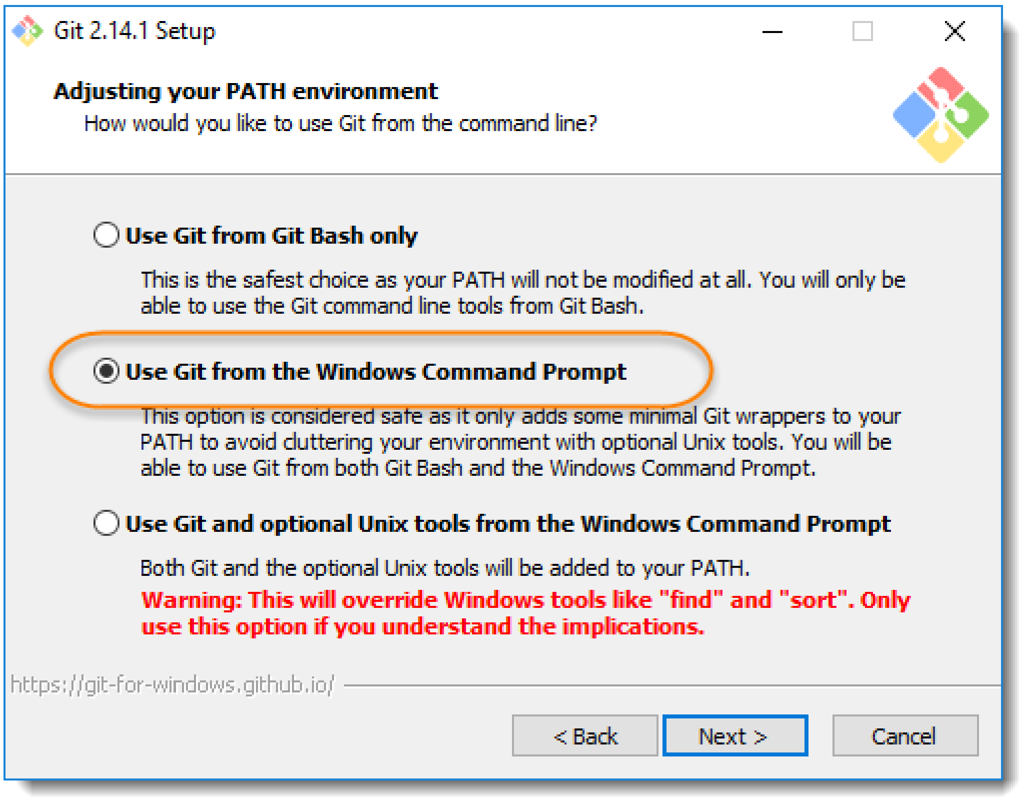
To continue, click Next. If you would like to select a different folder, click Browse.

C:\Program Files\Git

At least 213.0 MB of free disk space is required.

https://git-for-windows.github.io/

STEP 5: This is asking your choice that whether you like to Git from the **Windows Command Prompt** or you like to use some other program like **Git Bash**.



Git 2.14.1 Setup

Adjusting your PATH environment

How would you like to use Git from the command line?

( ) **Use Git from Git Bash only**

This is the safest choice as your PATH will not be modified at all. You will only be able to use the Git command line tools from Git Bash.

(●) **Use Git from the Windows Command Prompt**

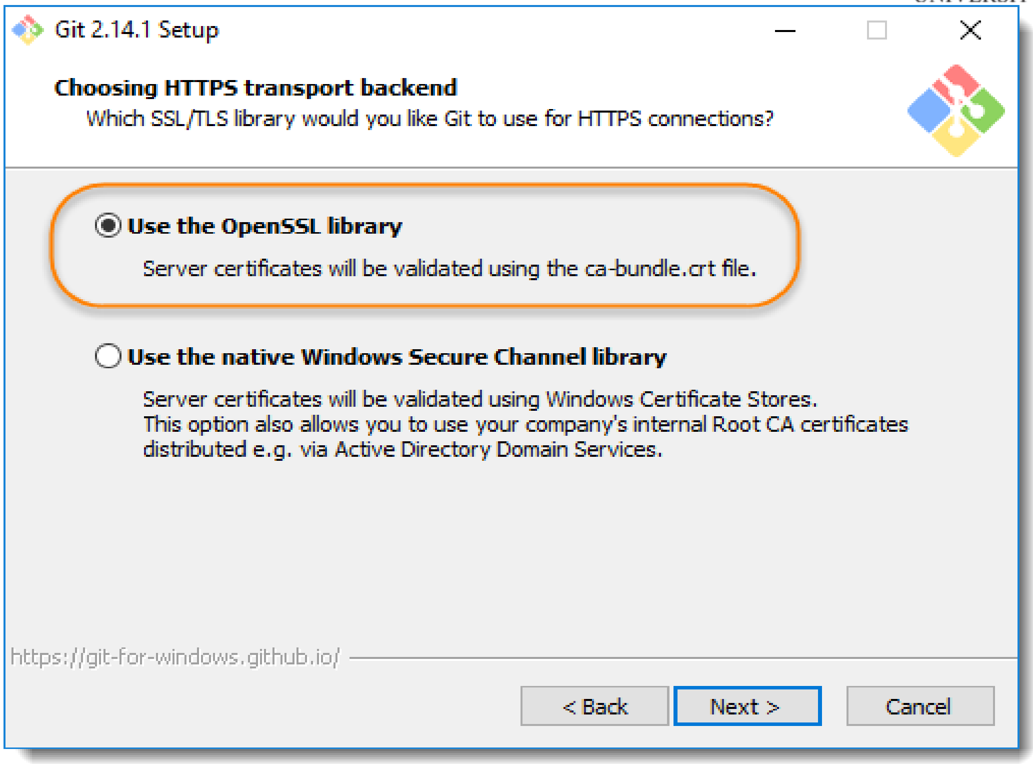
This option is considered safe as it only adds some minimal Git wrappers to your PATH to avoid cluttering your environment with optional Unix tools. You will be able to use Git from both Git Bash and the Windows Command Prompt.

( ) **Use Git and optional Unix tools from the Windows Command Prompt**

Both Git and the optional Unix tools will be added to your PATH.

Warning: This will override Windows tools like "find" and "sort". Only use this option if you understand the implications.

STEP 6: Select use the openSSL library


Git 2.14.1 Setup

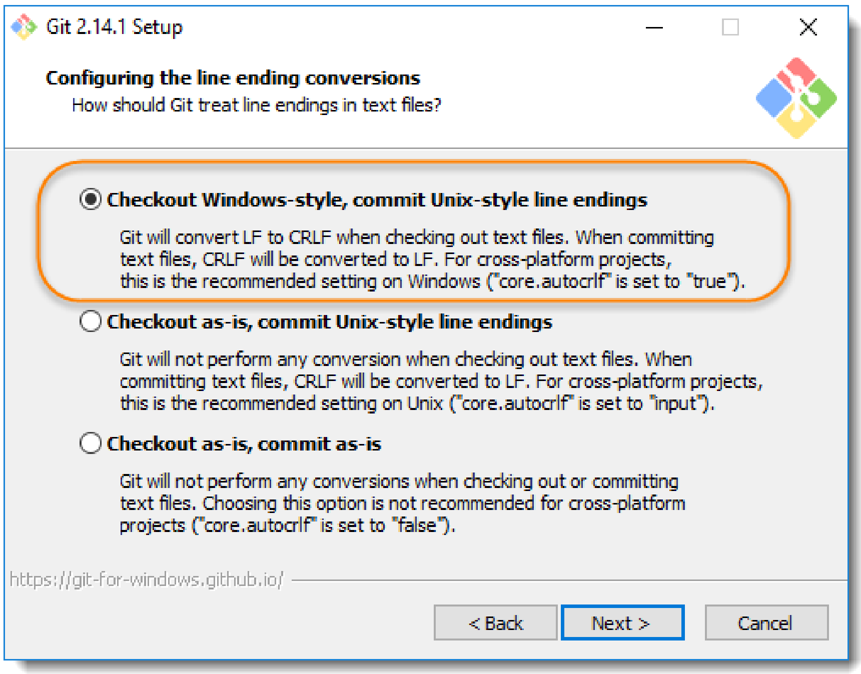
Choosing HTTPS transport backend
Which SSL/TLS library would you like Git to use for HTTPS connections?

[✓ **Use the OpenSSL library**]
Server certificates will be validated using the ca-bundle.crt file.

Use the native Windows Secure Channel library
Server certificates will be validated using Windows Certificate Stores.
This option also allows you to use your company's internal Root CA certificates distributed e.g. via Active Directory Domain Services.

https://git-for-windows.github.io/

STEP 7: select the option and click on next.


Git 2.14.1 Setup

Configuring the line ending conversions
How should Git treat line endings in text files?

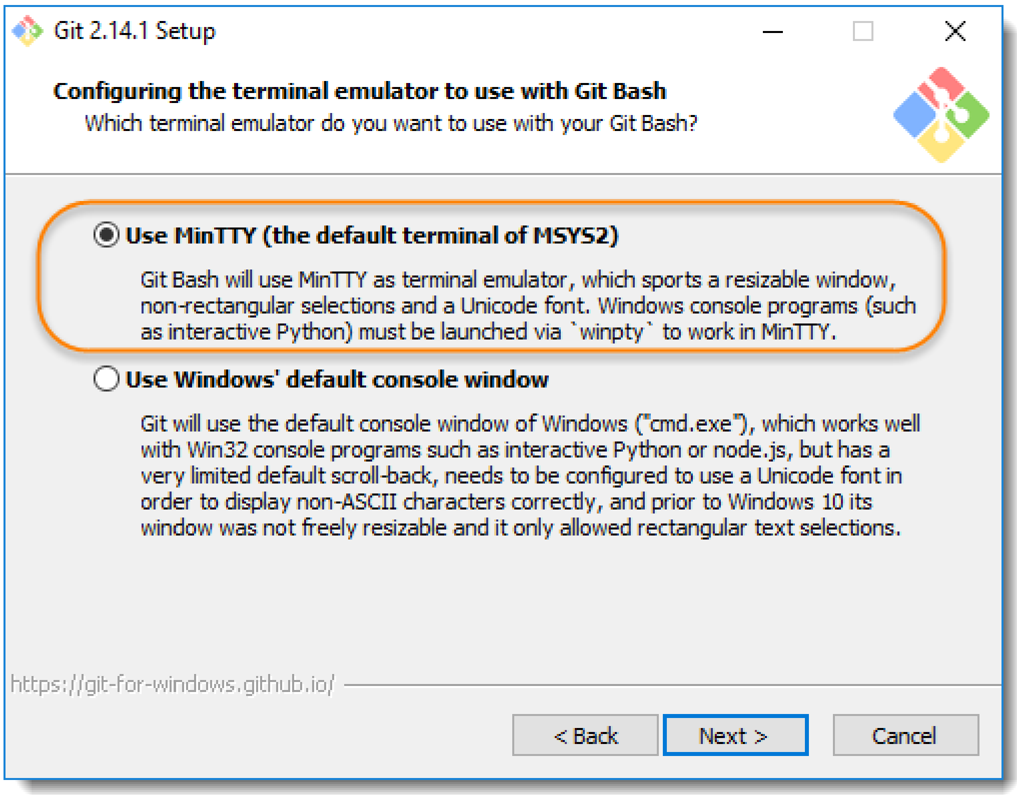
[✓ **Checkout Windows-style, commit Unix-style line endings**]
Git will convert LF to CRLF when checking out text files. When committing text files, CRLF will be converted to LF. For cross-platform projects, this is the recommended setting on Windows ("core.autocrlf" is set to "true").

Checkout as-is, commit Unix-style line endings
Git will not perform any conversion when checking out text files. When committing text files, CRLF will be converted to LF. For cross-platform projects, this is the recommended setting on Unix ("core.autocrlf" is set to "input").

Checkout as-is, commit as-is
Git will not perform any conversions when checking out or committing text files. Choosing this option is not recommended for cross-platform projects ("core.autocrlf" is set to "false").

https://git-for-windows.github.io/

STEP 8: select the option and click on next.



Configuring the terminal emulator to use with Git Bash

Which terminal emulator do you want to use with your Git Bash?

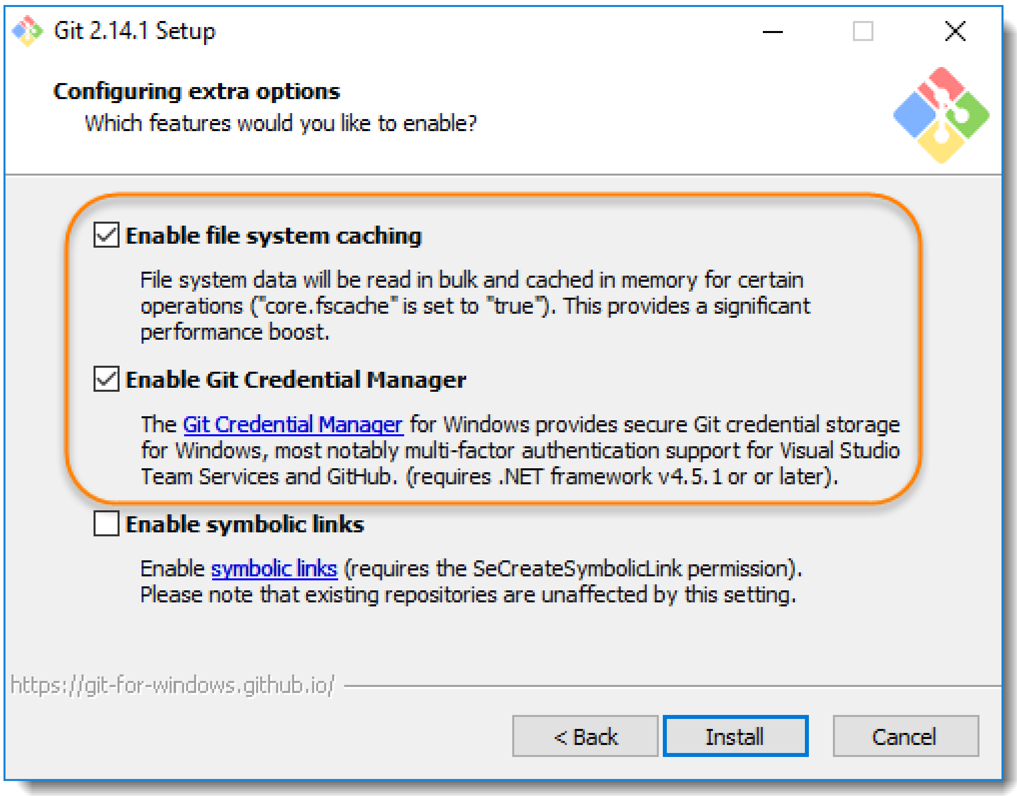
● **Use MinTTY (the default terminal of MSYS2)**

Git Bash will use MinTTY as terminal emulator, which sports a resizable window, non-rectangular selections and a Unicode font. Windows console programs (such as interactive Python) must be launched via `winpty` to work in MinTTY.

○ **Use Windows' default console window**

Git will use the default console window of Windows ("cmd.exe"), which works well with Win32 console programs such as interactive Python or node.js, but has a very limited default scroll-back, needs to be configured to use a Unicode font in order to display non-ASCII characters correctly, and prior to Windows 10 its window was not freely resizable and it only allowed rectangular text selections.

STEP 9: Just go with the default selections and click on install



Configuring extra options

Which features would you like to enable?

☑ **Enable file system caching**

File system data will be read in bulk and cached in memory for certain operations ("core.fscache" is set to "true"). This provides a significant performance boost.

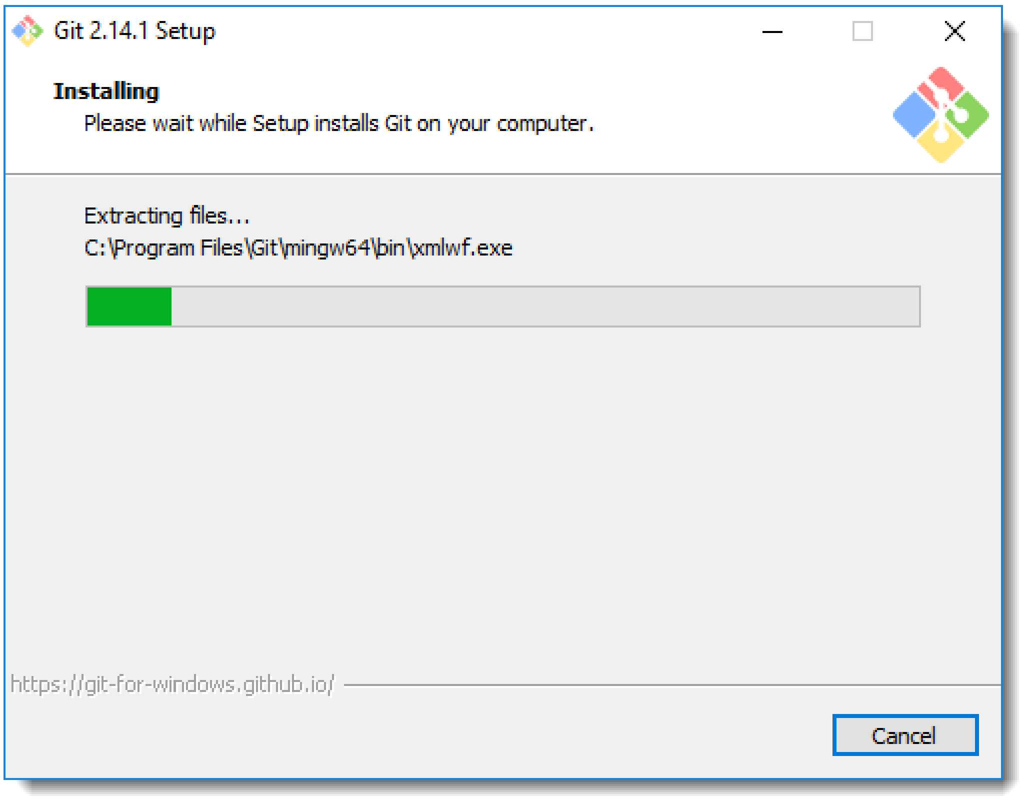
☑ **Enable Git Credential Manager**

The Git Credential Manager for Windows provides secure Git credential storage for Windows, most notably multi-factor authentication support for Visual Studio Team Services and GitHub. (requires .NET framework v4.5.1 or or later).

☐ **Enable symbolic links**

Enable symbolic links (requires the SeCreateSymbolicLink permission). Please note that existing repositories are unaffected by this setting.

STEP 10: Wait for minutes for the installation to complete.



Git 2.14.1 Setup

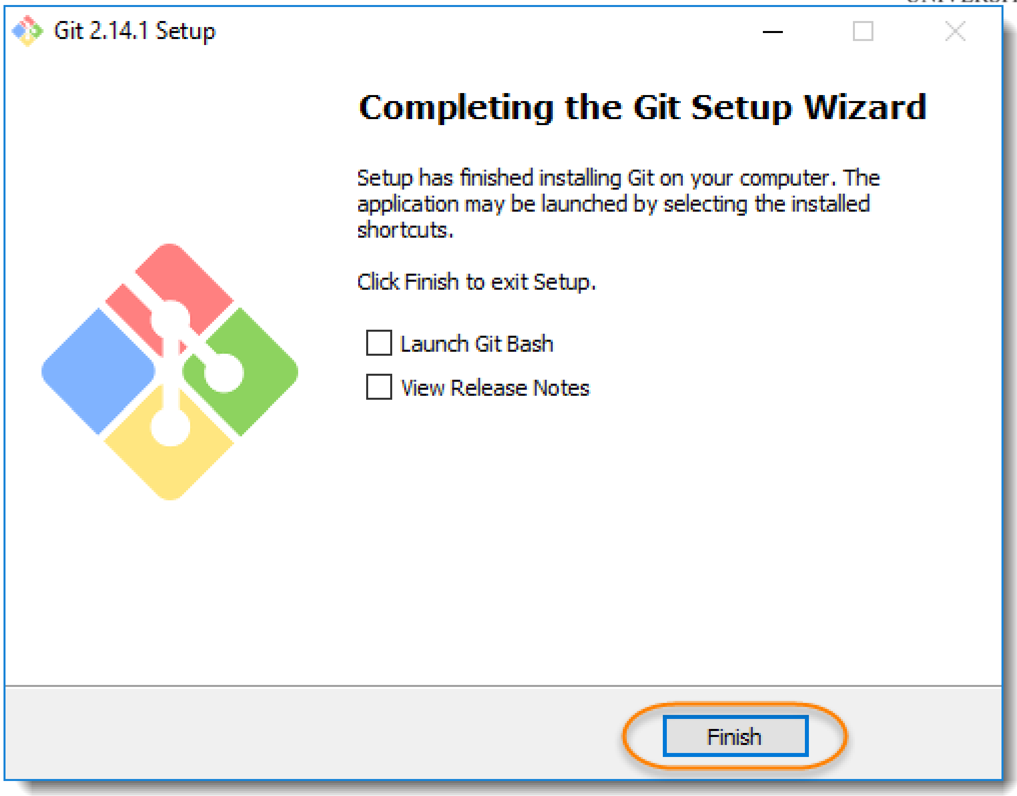
Installing

Please wait while Setup installs Git on your computer.

Extracting files...
C:\Program Files\Git\mingw64\bin\xmlwf.exe

https://git-for-windows.github.io/

STEP 11: Once done just click on finish button and the GitHub is installed on your systems.



Git 2.14.1 Setup

Completing the Git Setup Wizard

Setup has finished installing Git on your computer. The application may be launched by selecting the installed shortcuts.

Click Finish to exit Setup.

- [ ] Launch Git Bash
- [ ] View Release Notes

AIM : TO SETUP GITHUB ACCOUNT

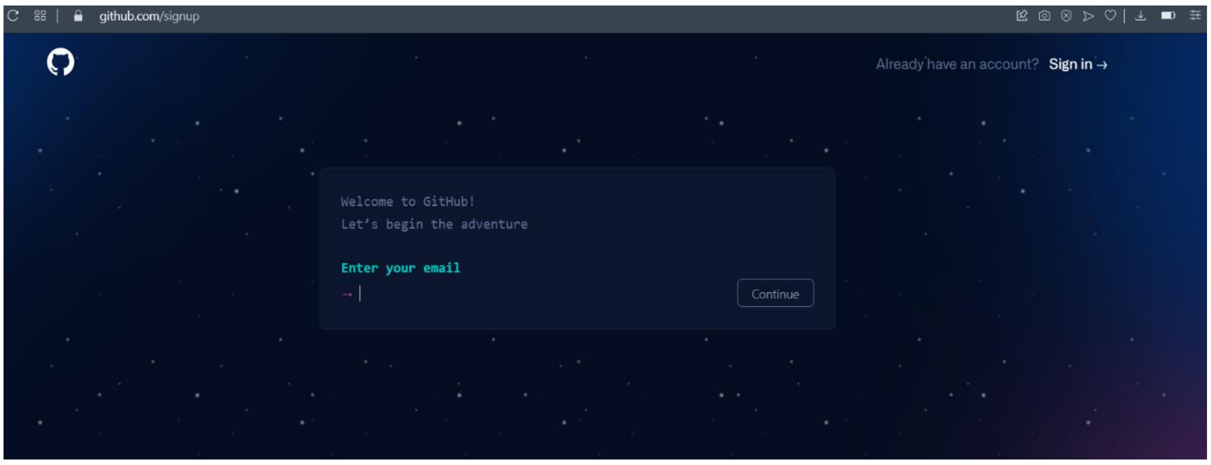
THEORY:

GitHub is a website and cloud-based service (client) that helps an individual or a developer to store and manage their code. We can also track as well as control changes to our or public code. GitHub's has a user-friendly interface and is easy to use .

We can connect the git-hub and git but using some commands shown below in figure 001. Without GitHub we cannot use Git because it generally requires a host and if we are working for a project, we need to share it will our team members, which can only be done by making a repository . Additionally , anyone can sign up and host a public code repository for free, which makes GitHub especially popular with open-source projects

PROCEDURE:

STEP1: On any search engine like google, Microsoft edge, opera, etc. , search for git-hub.
A dialogue box would appear welcoming you to the git-hub.



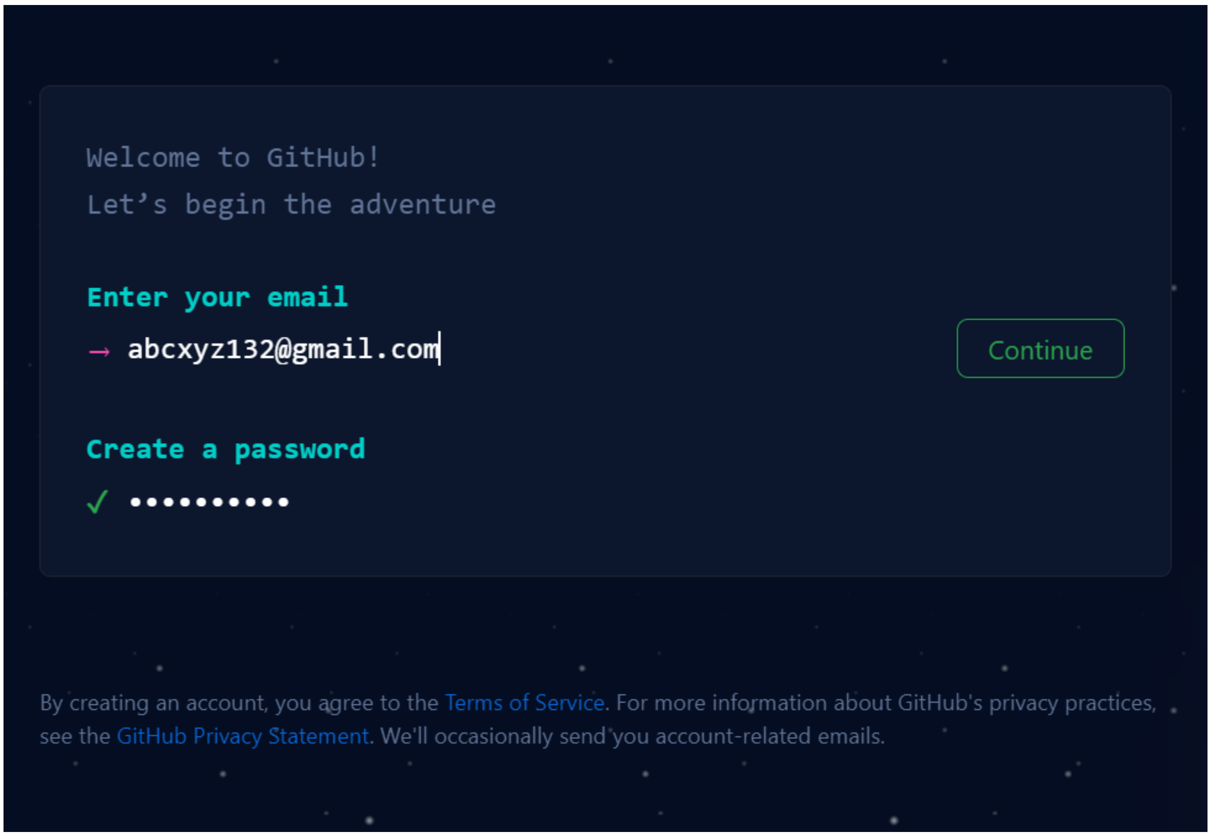
Welcome to GitHub!
Let's begin the adventure

Enter your email
→ |

STEP2: If you already have an account, then on the top right corner there's an option of signing up. Click on "SIGN IN ".

STEP 3: But if you don't have any account, then enter your email and continue

STEP 4: Then create a strong password for your GitHub account



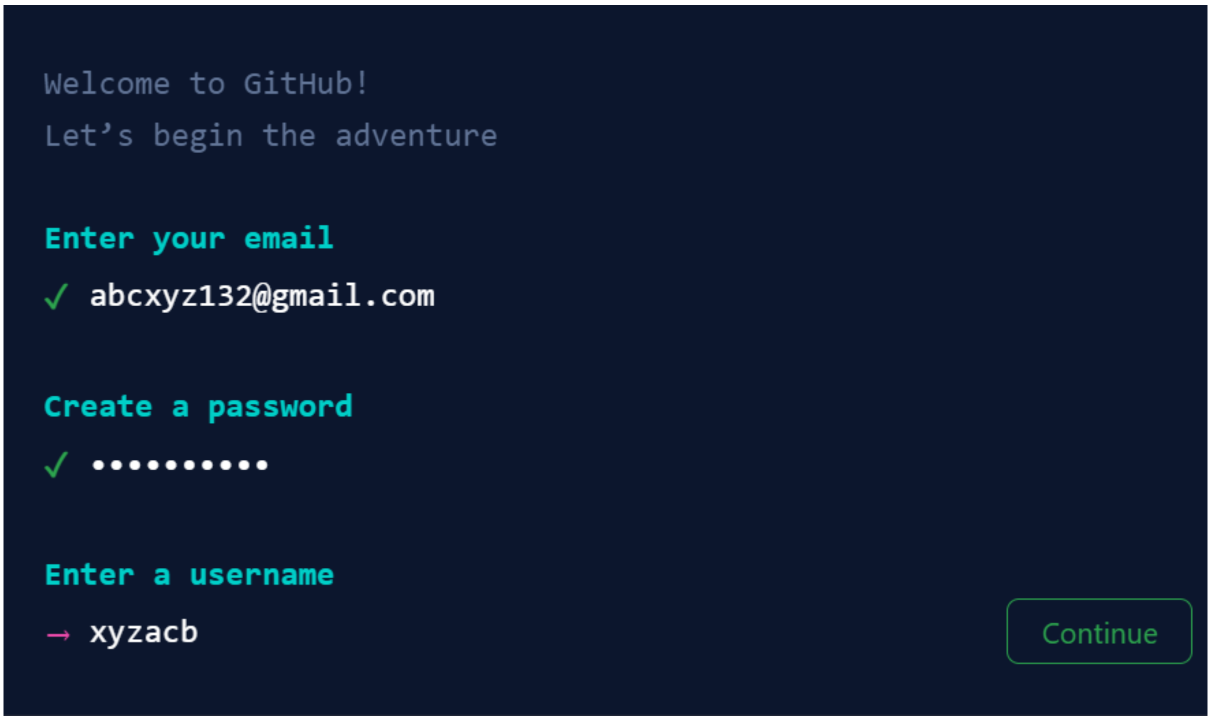
Welcome to GitHub!
Let's begin the adventure

Enter your email
→ abcxyz132@gmail.com

Create a password
✓ ••••••••••

By creating an account, you agree to the Terms of Service. For more information about GitHub's privacy practices, see the GitHub Privacy Statement. We'll occasionally send you account-related emails.

STEP 4: Create a username



Welcome to GitHub!
Let's begin the adventure

Enter your email
✓ abcxyz132@gmail.com

Create a password
✓ ••••••••••

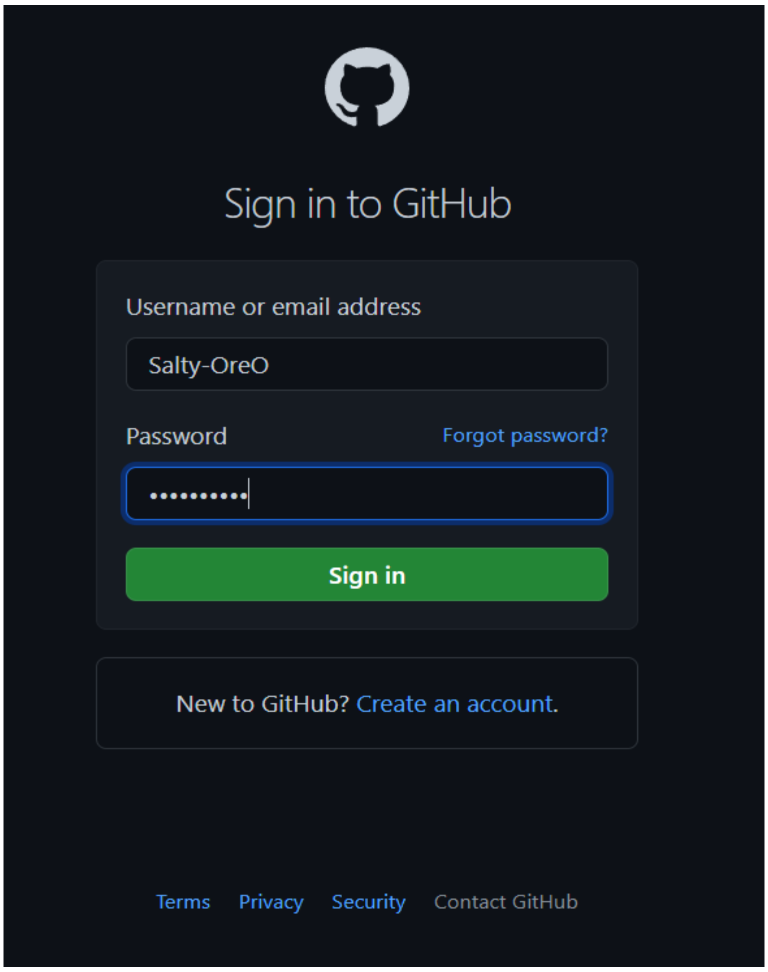
Enter a username
→ xyzacb

STEP 5: fill in all the details that are required and click on create account and your GitHub account would be created

BUT IF YOU ALREADY HAVE AN ACCOUNT, THEN FOLLOW THESE STEPS:

STEP 1: Sign In

Enter your email-address or username , then the password and continue



Sign in to GitHub

Username or email address

Salty-OreO

Password Forgot password?

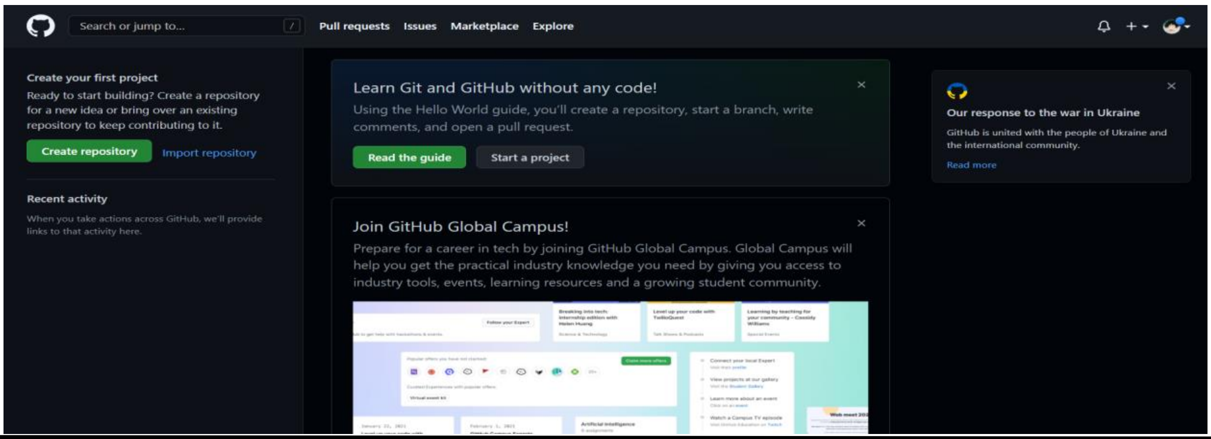
••••••••••

Sign in

New to GitHub? Create an account.

Terms Privacy Security Contact GitHub

STEP 2: you have logged in in your account. Now you can create and edit any project



Search or jump to... Pull requests Issues Marketplace Explore

Create your first project
Ready to start building? Create a repository for a new idea or bring over an existing repository to keep contributing to it.
Create repository Import repository

Recent activity
When you take actions across GitHub, we'll provide links to that activity here.

Learn Git and GitHub without any code!
Using the Hello World guide, you'll create a repository, start a branch, write comments, and open a pull request.
Read the guide Start a project

Join GitHub Global Campus!
Prepare for a career in tech by joining GitHub Global Campus. Global Campus will help you get the practical industry knowledge you need by giving you access to industry tools, events, learning resources and a growing student community.

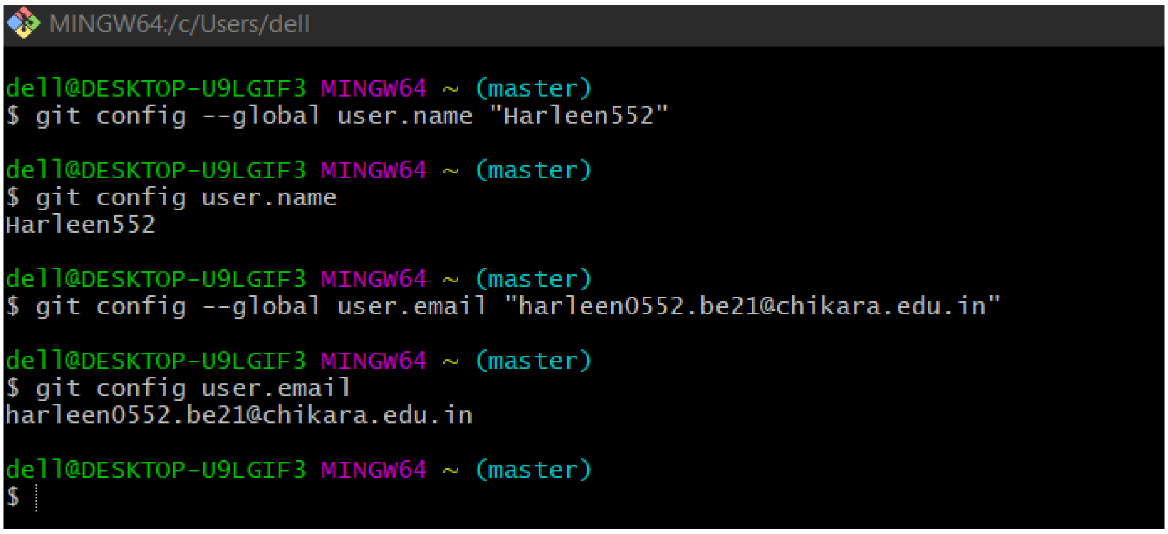
Our response to the war in Ukraine
GitHub is united with the people of Ukraine and the international community.
Read more

Linking GitHub account with Git Bash:

Username:
git config --global user.name "username in github"

Email:
git config --global user.email "your email in github"

Check Username & Email:
git config user.name
git config user.email



MINGW64:/c/Users/dell

```
dell@DESKTOP-U9LGIF3 MINGW64 ~ (master)
$ git config --global user.name "Harleen552"

dell@DESKTOP-U9LGIF3 MINGW64 ~ (master)
$ git config user.name
Harleen552

dell@DESKTOP-U9LGIF3 MINGW64 ~ (master)
$ git config --global user.email "harleen0552.be21@chikara.edu.in"

dell@DESKTOP-U9LGIF3 MINGW64 ~ (master)
$ git config user.email
harleen0552.be21@chikara.edu.in

dell@DESKTOP-U9LGIF3 MINGW64 ~ (master)
$
```

EXPERIMENT 3

AIM : PROGRAM TO GENERATE LOGS

THEORY:

Git Logs:

Logs are nothing but the history which we can see in git . It contains all the past commits, insertions and deletions in it which we can see any time.

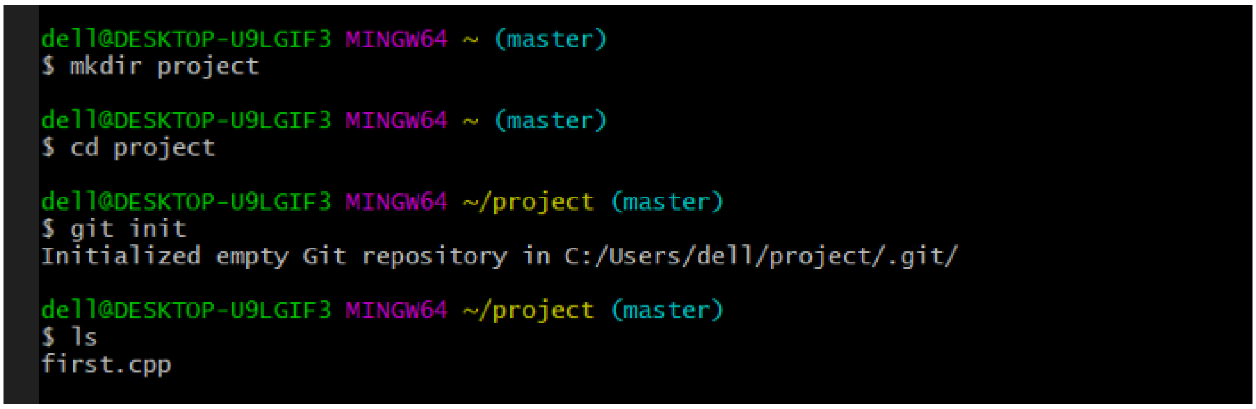
Why do we need logs:

Logs helps to check that what were the changes in the code or any other file and by whom. It also contains the number of insertions and deletions including at which time it was changed.

PROCEDURE:

The command used to generate logs in git is :

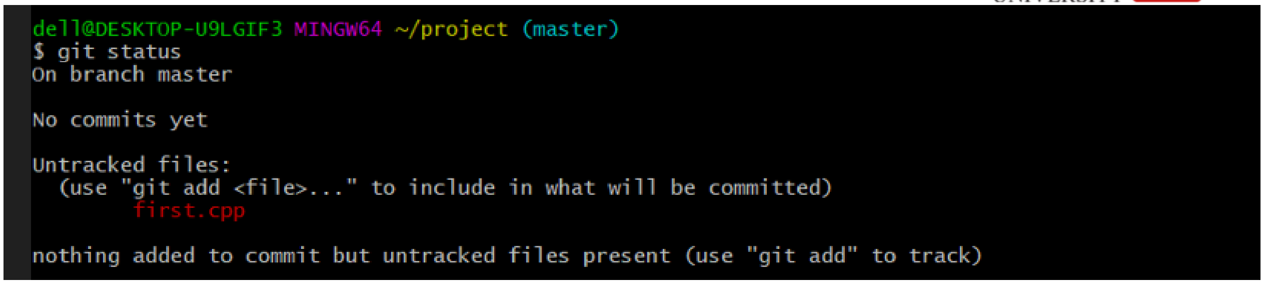
STEP1: Create a file in the folder.



```
dell@DESKTOP-U9LGIF3 MINGW64 ~ (master)
$ mkdir project

dell@DESKTOP-U9LGIF3 MINGW64 ~ (master)
$ cd project

dell@DESKTOP-U9LGIF3 MINGW64 ~/project (master)
$ git init
Initialized empty Git repository in C:/Users/dell/project/.git/

dell@DESKTOP-U9LGIF3 MINGW64 ~/project (master)
$ ls
first.cpp
```

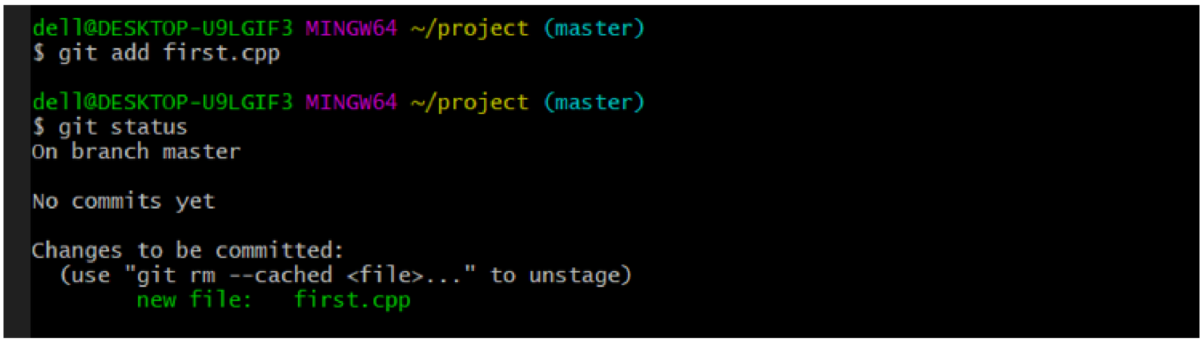
STEP 2: Check status

It will show the file name in red colour. This means that the file is untracked.



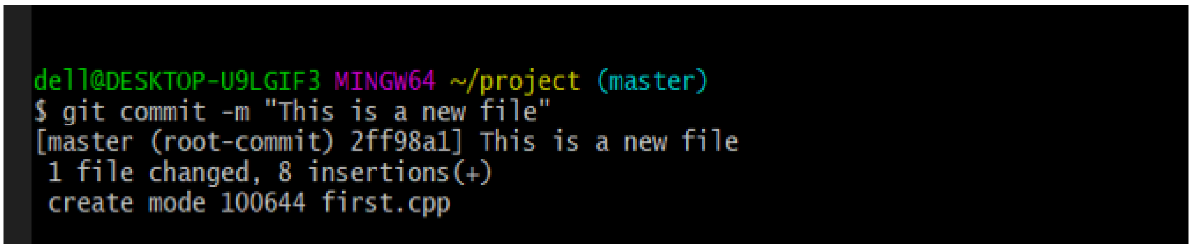
```
dell@DESKTOP-U9LGIF3 MINGW64 ~/project (master)
$ git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        first.cpp

nothing added to commit but untracked files present (use "git add" to track)
```

STEP 3: Staging of file



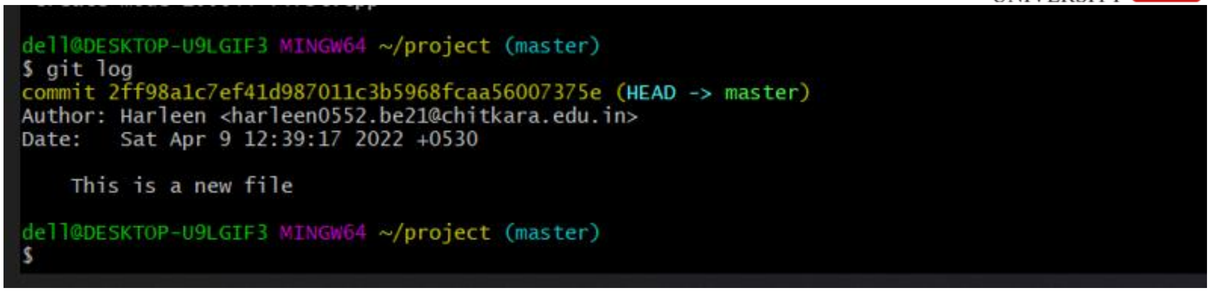
```
dell@DESKTOP-U9LGIF3 MINGW64 ~/project (master)
$ git add first.cpp

dell@DESKTOP-U9LGIF3 MINGW64 ~/project (master)
$ git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
        new file:   first.cpp
```

STEP 4: Commit the file and check the status



```
dell@DESKTOP-U9LGIF3 MINGW64 ~/project (master)
$ git commit -m "This is a new file"
[master (root-commit) 2ff98a1] This is a new file
 1 file changed, 8 insertions(+)
 create mode 100644 first.cpp
```

STEP 5: Now run the command $ git log to generate the commits



```
dell@DESKTOP-U9LGIF3 MINGW64 ~/project (master)
$ git log
commit 2ff98a1c7ef41d987011c3b5968fcaa56007375e (HEAD -> master)
Author: Harleen <harleen0552.be21@chitkara.edu.in>
Date:   Sat Apr 9 12:39:17 2022 +0530

    This is a new file

dell@DESKTOP-U9LGIF3 MINGW64 ~/project (master)
$
```

- ✓ As it can be observed, on using this command, the system displays all the changes made in the file or list of all the commits in the history along with the information of the user.
- ✓ **This commands clearly defines the git as the 'version-controlled system' as it allows us to rollback to any of the previous working states and keeps track of all the versions.**

EXPERIMENT 4

AIM : TO CREATE AND VISUALIZE BRANCHES.

THEORY:

In Git, a branch is a new/separate version of the main repository.

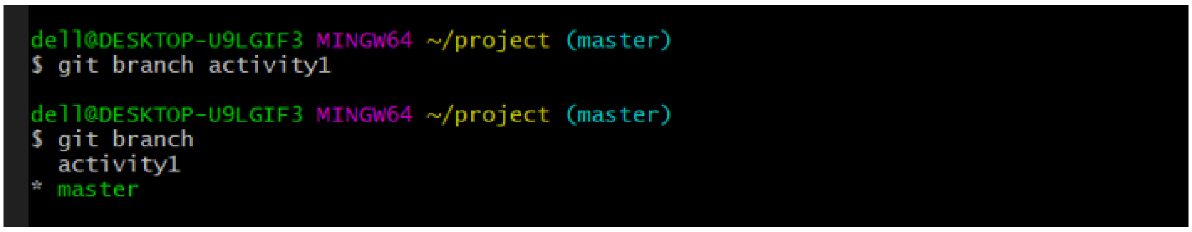
Branches allow you to work on different parts of a project without impacting the main branch.
When the work is complete, a branch can be merged with the main project.
You can even switch between branches and work on different projects without them interfering with each other.

FOLLOW THESE STEPS TO CREATE A NEW BRANCH IN GIT.

1.To create a branch, enter:

$ git branch ____

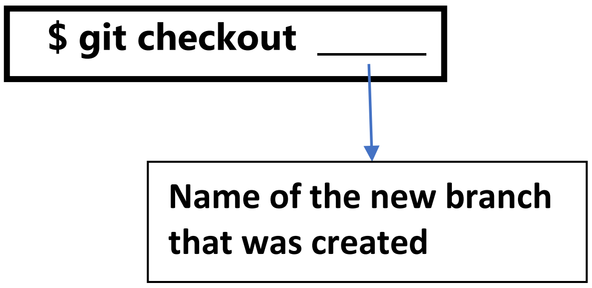
Write the name of the branch you want to create

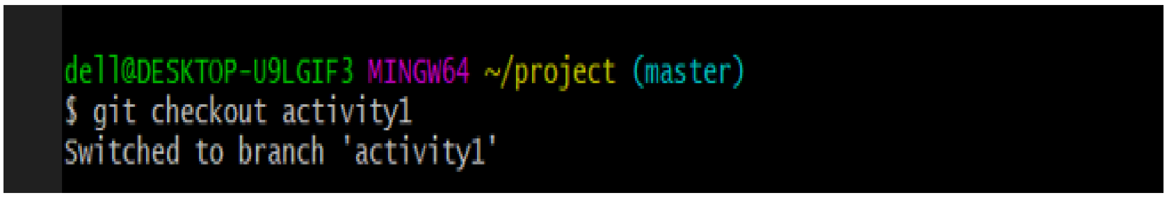


```
dell@DESKTOP-U9LGIF3 MINGW64 ~/project (master)
$ git branch activity1

dell@DESKTOP-U9LGIF3 MINGW64 ~/project (master)
$ git branch
  activity1
* master
```

The branch has been created, the * beside master specifies that we are currently on that branch.

2.The next step is to transfer the data from the master branch to the new branch. For this we use:





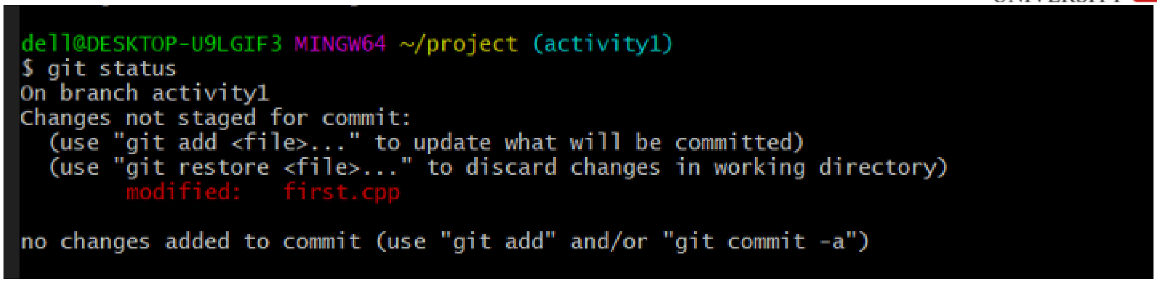
```
dell@DESKTOP-U9LGIF3 MINGW64 ~/project (master)
$ git checkout activity1
Switched to branch 'activity1'
```

checkout is the command used to check out a branch. Moving us from the current branch, to the one specified at the end of the command:

3.Staging the file.

We have made changes to a file.
Now check the status of the current branch:

You would observe the name of the file is in red colour with a notation "untracked ".

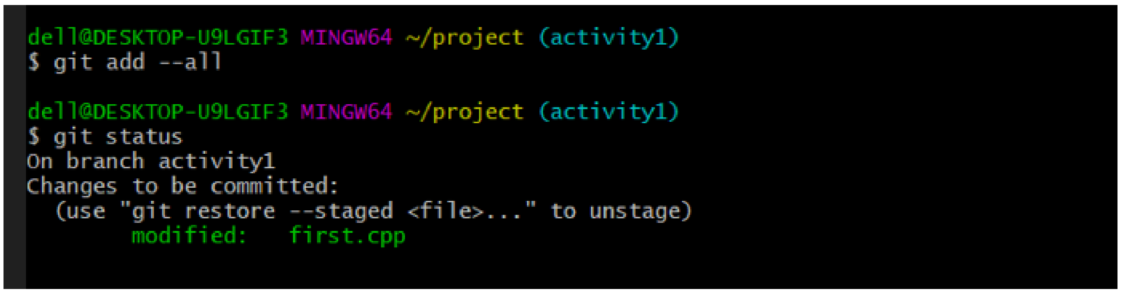


```
dell@DESKTOP-U9LGIF3 MINGW64 ~/project (activity1)
$ git status
On branch activity1
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   first.cpp

no changes added to commit (use "git add" and/or "git commit -a")
```

This means that only the data has been transferred to the file but we cannot make changes in the same as the current working directory is the master branch.

To overcome this, we stage the file by using the command**:**

$ git add –all



```
dell@DESKTOP-U9LGIF3 MINGW64 ~/project (activity1)
$ git add --all

dell@DESKTOP-U9LGIF3 MINGW64 ~/project (activity1)
$ git status
On branch activity1
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        modified:   first.cpp
```

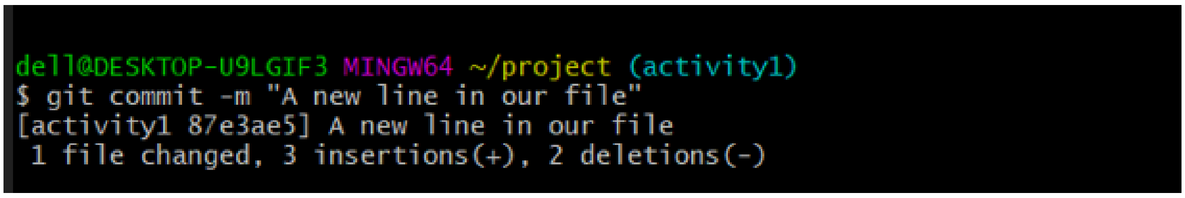
Check if the file is staged or not by using $ git status command.

✓ As you can observe the file name is green in colour now which denotes the file is staged.

4.Commit

After staging we need to commit. This assures the system that the directory has been shifted to the new file. For this, the command used is:

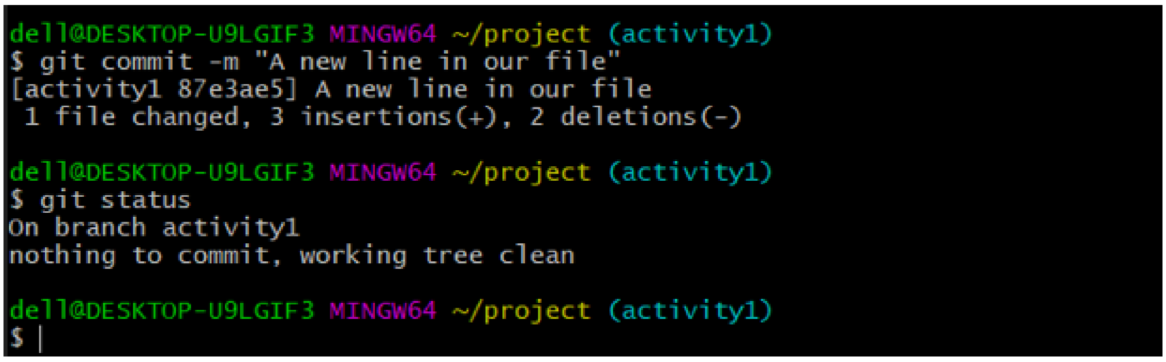
$ git commit-m "message"



```
dell@DESKTOP-U9LGIF3 MINGW64 ~/project (activity1)
$ git commit -m "A new line in our file"
[activity1 87e3ae5] A new line in our file
 1 file changed, 3 insertions(+), 2 deletions(-)
```

5.Check the status

On checking the status, a message will be displayed as ‘ working tree clean’. Which means all the files inside that directory are tracked.



```
dell@DESKTOP-U9LGIF3 MINGW64 ~/project (activity1)
$ git commit -m "A new line in our file"
[activity1 87e3ae5] A new line in our file
 1 file changed, 3 insertions(+), 2 deletions(-)

dell@DESKTOP-U9LGIF3 MINGW64 ~/project (activity1)
$ git status
On branch activity1
nothing to commit, working tree clean

dell@DESKTOP-U9LGIF3 MINGW64 ~/project (activity1)
$ |
```

Now you can make any of the changes in the file but the modifications won’t be reflected in the master branch.

AIM: TO EXPLAIN GIT LIFECYCLE

THEORY: When a project is under Git version control system, they are present in three major Git states in addition to these basic ones. Here are the three Git states**:**

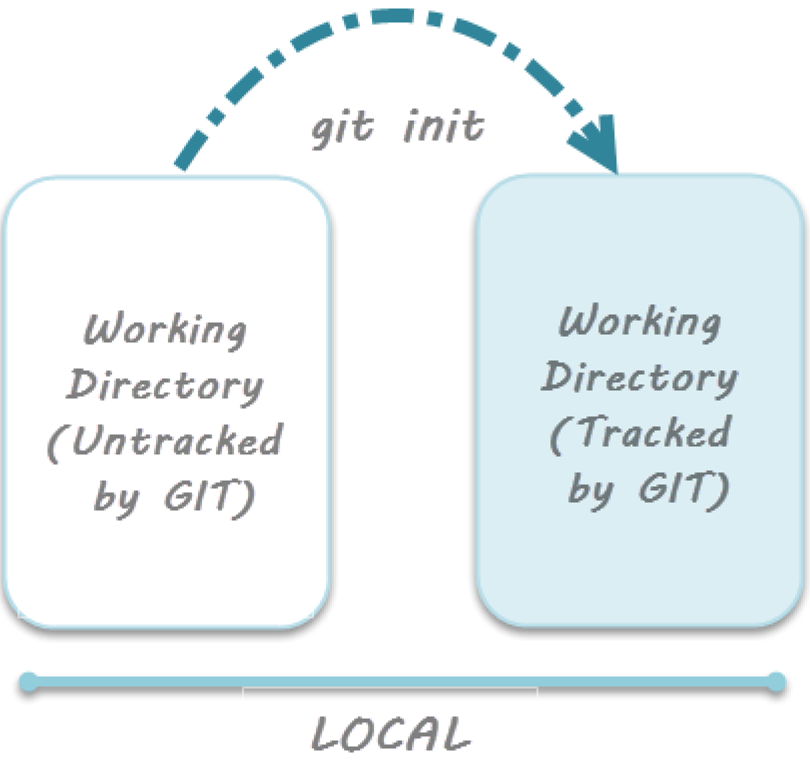
1. **Working directory**
2. **Staging area**
3. **Git directory**

1.Working Directory

Consider a project residing in your local system. This project may or may not be tracked by Git. In either case, this project directory is called your Working directory. Working directory is the directory containing hidden .git folder**.**

Working directory is the directory containing hidden .git folder.

git init - *Command to initialize a Git repository*


git init
Working Directory (Untracked by GIT)
Working Directory (Tracked by GIT)
LOCAL

reference for picture: www.toolsqa.com/git/git-life-cycle/

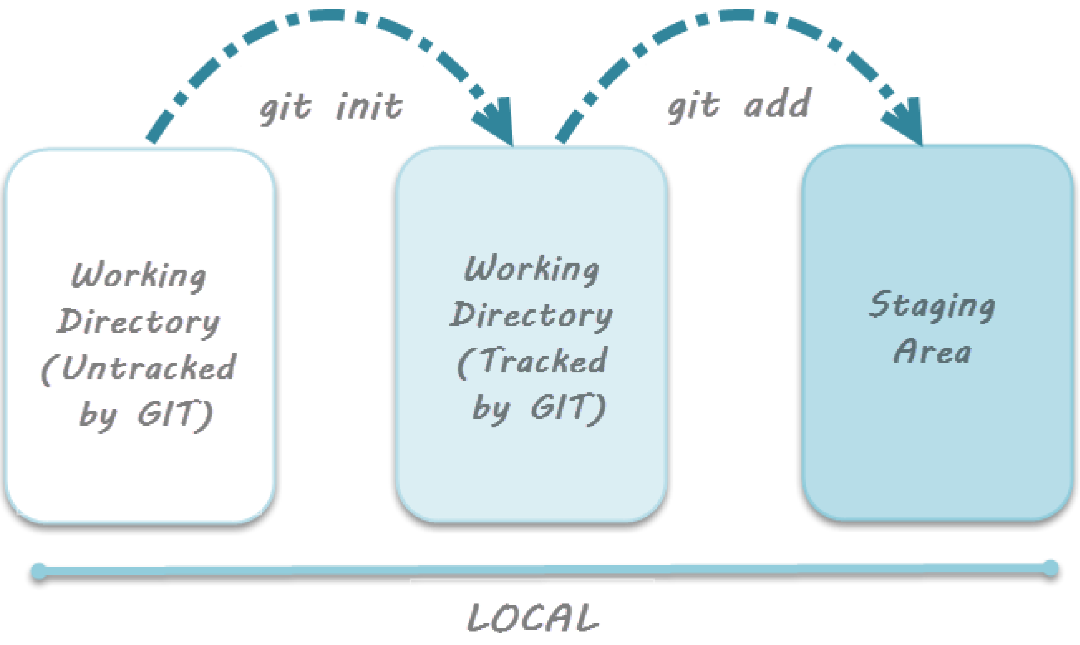
2.Staging area

some files in the project like class files, log files, result files and temporary data files are dynamically generated. It doesn't make sense to track the versions of these files.

Whereas the source code files, data files, configuration files and other project artifacts contain the business logic of the application. These files are to be tracked by Git are thus needs to be added to the staging area.

In other words, staging area is the playground where you group, add and organize the files to be committed to Git for tracking their versions.

git add *- Command to add files to staging area.*


git init
git add
Working Directory (Untracked by GIT)
Working Directory (Tracked by GIT)
Staging Area
LOCAL

{reference for picture: www.toolsqa.com/git/git-life-cycle/ }

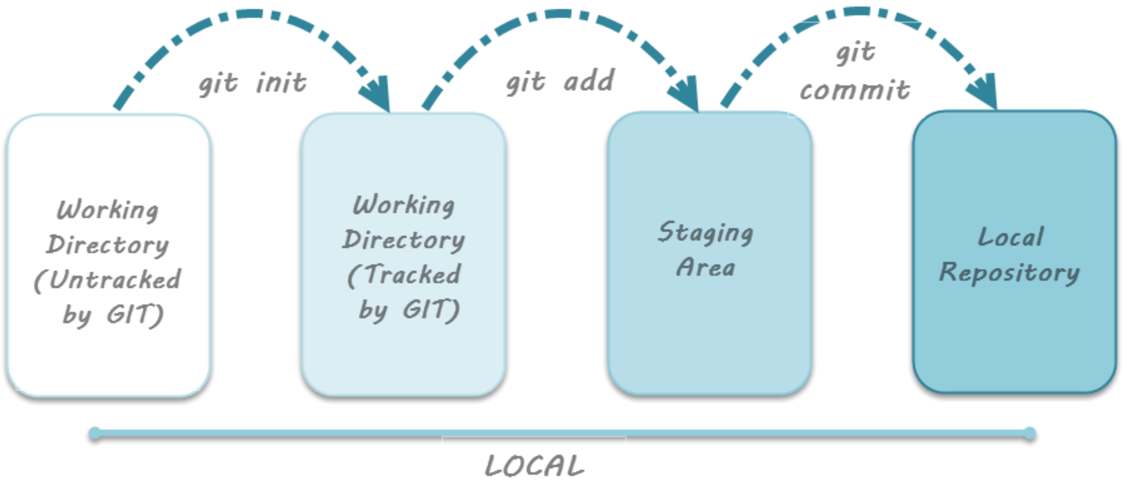
3.Git Directory

Now that the files to be committed are grouped and ready in the staging area, we can commit these files. So, we commit this group of files along with a commit message explaining what is the commit about. Apart from commit message, this step also records the author and time of the

commit. Now, a snapshot of the files in the commit is recorded by Git. The information related to this commit is stored in the Git directory.

Thus, Git directory is the database where metadata about project files' history will be tracked.

git commit -m"your message" - *Command to commit files to Git repository with message*.


git init
git add
git commit
Working Directory (Untracked by GIT)
Working Directory (Tracked by GIT)
Staging Area
Local Repository
LOCAL

{reference for picture: www.toolsqa.com/git/git-life-cycle/ }